WHAT IS CLAIMED IS:

1. A metal cathode for an electron-beam device, the metal cathode comprising an electron-emitter including a first alloy, the first alloy comprising:

barium (Ba) being in the range of 0.1 to 20% by weight based on the total weight of the first alloy;

a metallic mobilizer being in the range of 0.1 to 20% by weight based on the total weight of the first alloy, the metallic mobilizer facilitating Ba diffusion, the metallic mobilizer being at least one selected from the group consisting essentially of molybdenum (Mo), hafnium (Hf), zirconium (Zr), and thorium (Th);

a metal with a difference in atomic radius of at least 0.4 Angstrom from the atomic radius of any one of platinum (Pt) and palladium (Pd), the metal being in the range of 0.01 to 30% by weight based on the total weight of the first alloy; and

at least one element selected from the group consisting essentially of platinum (Pt) and palladium (Pd).

2. The metal cathode of claim 1, wherein the metal is at least one member selected from the group consisting essentially of calcium (Ca), strontium (Sr), and cerium (Ce).

3. The metal cathode of claim 1, wherein the metal is an alloy of cerium (Ce) and

iridium (Ir).

4. The metal cathode of claim 3, wherein the alloy of Ce and Ir is Ir_5Ce.

5. A cathode assembly comprising the metal cathode of claim 4, the cathode assembly being indirectly heated.

6. A cathode assembly comprising the metal cathode of claim 1, the cathode assembly being indirectly heated.

7. A metal cathode for an electron-beam device, comprising:

an electron-emitter formed of a first alloy comprising:

barium (Ba) being in the range of 0.1 to 20% by weight based on the total weight of the first alloy;

a metallic mobilizer facilitating Ba diffusion being in the range of 0.1 to 20% by weight based on the total weight of the first alloy, the metallic mobilizer being at least one member selected from the group consisting essentially of molybdenum (Mo), hafnium (Hf), zirconium (Zr), and thorium (Th);

a metal with a difference in atomic radius of at least 0.4 Angstrom from the atomic radius of any one of platinum (Pt) and palladium (Pd), the metal being in the range of 0.01 to 30%

by weight based on the total weight of the first alloy; and

at least one element selected from the group consisting essentially of platinum (Pt) and palladium (Pd); and

a layer coated on the electron-emitter, the layer being at least one member consisting essentially of iridium (Ir) and an alloy of osmium (Os) and ruthenium (Ru).

8. The metal cathode of claim 7, wherein the metal is at least one member selected from the group consisting essentially of calcium (Ca), strontium (Sr), and cerium (Ce).

9. The metal cathode of claim 7, wherein the metal is an alloy of cerium (Ce) and iridium (Ir).

10. The metal cathode of claim 9, wherein the alloy of Ce and Ir is Ir_5Ce.

11. The metal cathode of claim 7, wherein the layer coated on the electron-emitter has a thickness in the range of 500 to 30,000 Angstroms.

12. The metal cathode of claim 7, wherein the layer coated on the electron-emitter has a thickness in the range of 1,000 to 10,000 Angstroms.

13. The metal cathode of claim 11, wherein the alloy of Os and Ru includes Ru in the range of 1 to 10% by weight based on the total weight of the alloy of Os and Ru.

14. A cathode assembly comprising the metal cathode of claim 7, the cathode assembly being indirectly heated.

15. A cathode assembly comprising the metal cathode of claim 11, the cathode assembly being indirectly heated.

16. A metal cathode for an electron-beam device, the metal cathode comprising:

an electron-emitter consisting essentially of:

barium (Ba) being in the range of 0.1 to 20% by weight based on the total weight of the electron-emitter;

a metallic mobilizer being in the range of 0.1 to 20% by weight based on the total weight of the electron-emitter, the metallic mobilizer facilitating Ba diffusion, the metallic mobilizer being at least one member selected from the group consisting essentially of molybdenum (Mo), hafnium (Hf), zirconium (Zr), and thorium (Th);

a metal with a difference in atomic radius of at least 0.4 Angstrom from the atomic radius of any one of platinum (Pt) and palladium (Pd), the metal being in the range of 0.01 to 30% by weight based on the total weight of the electron-emitter; and

a balance of at least one of platinum (Pt) and palladium (Pd).

17. The metal cathode of claim 16, further comprising a layer coated on the electron-emitter, the layer being at least one member consisting essentially of iridium (Ir) and an alloy of osmium (Os) and ruthenium (Ru).

18. A cathode assembly comprising the metal cathode of claim 17, the cathode assembly being indirectly heated.

19. A cathode assembly comprising the metal cathode of claim 16, the cathode assembly being indirectly heated.